

USER MANUAL
ELECTRICAL PARALLEL GRIPPER GPE
Mechanical Part

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1. Important information

1.1. Introduction

This User Manual describes the mechanical design, the technical data, the load limits, installation, maintenance and spare parts of the electrical parallel gripper GPE.

1.2. EU - conformance (to EU Directive on Machines, Appendix II A)

Rules and standards complied with:

Machinery guidelines 89/392/EEC, 91/368/EEC

Manufacturer:

Montech AG, Gewerbestrasse 12 CH-4552 Derendingen

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1.3. Product description and application

Electrical parallel grippers GPE are electrically operated, moment-controlled grippers for internal and external gripping of parts. They are used wherever workpieces have to be regularly clamped for workpiece transport (handling).

The load limits which were specified by the technical data must be complied with in all circumstances. Overloading can lead to faults and failure of the devices.

1.4. Dangers

The use of electrical parallel grippers GPE in an installation is only permissible when they are guarded by **movable, isolating protective devices** as per EN 292-2, para.4.2.2.3. Failure to comply with this protective measure can result in injury due to fingers being squeezed or knocked, particularly in machines which start up automatically.

It is essential to comply with the operating conditions and safety instructions described in the controller User Manual. It is essential to comply with the stated load limits.



- During operation, the surface of the motor may reach up to 100°C. The motor must not be touched if the temperature has exceeded 40°C (measurement of the surface temperature).
- During maintenance work on the GPE, it must be ensured that the drive energy has been switched off and cannot be switched on by unauthorized persons.

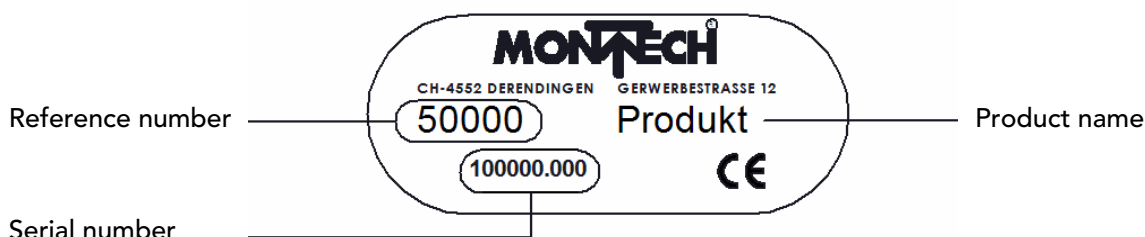
1.5. Additional information

The aim of the present User Manual is to enable users to employ electrical parallel grippers GPE correctly and safely. Should further information be required in relation to your particular application, please contact the manufacturer.

When reordering User Manuals, it is essential to quote the reference number, the product name and serial number.

This document can be obtained from our homepage www.montech.com.

Nameplate



Montech AG
Management



U. D. Wagner



C. Wullschleger

1.6. Validity of the User Manual

Our products are continually updated to reflect the latest state of the art and practical experience. In line with product developments, our User Manuals are continually updated. Every User Manual has an article number e.g. BA-100069 and an edition number (e.g. 02/2008). The article number and the date of edition are evident on the title page.

Validity

Main device:

Full name	Short name	Reference number
Electrical Parallel Gripper GPE	GPE	57833

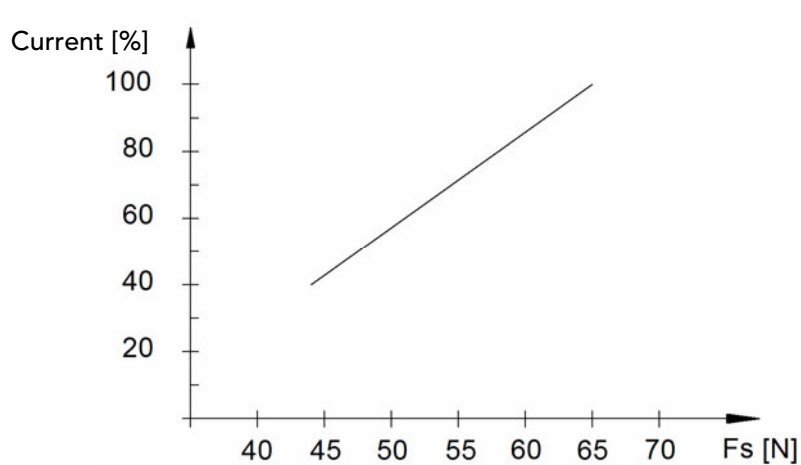
2. Technical Data

2.1. GPE Technical Data

Stroke = Total travel of jaws	[mm]	12
Opening/closing time	[s]	See diagram
Weight	[kg]	0.91
Mass moment of inertia J_z	[kgcm ²]	5.9
Max. cycles per minute		80
Drive		Brushless electronic commutated DC motor, toothed belt and ballscrew
Hall sensor resolution	1) [mm]	0.263
Rated motor power	[W]	25
Protection type		IP42
Repeatability	2) [mm]	±0.05
Check on end position open/closed	3)	inductive proximity switches
Supply voltage/current		24VDC / 1.5A
Ambient Temperature	[°C]	10...50
Rel. humidity		5%-85% (without condensation)
Purity of the air		Normal workshop atmosphere
Warranty period		2 years from the date of delivery
Mounting position		any
Material		Aluminum, steel, bronze, plastic

- 1) Stroke of the jaws per signal combination (with evaluation of the 6 hall sensor signal combinations per motor revolution)
- 2) Scatter of the clamped end position, measured for 100 successive strokes at constant motor temperature
- 3) See accessories

2.2. GPE Gripping force diagram with Speed > 50%

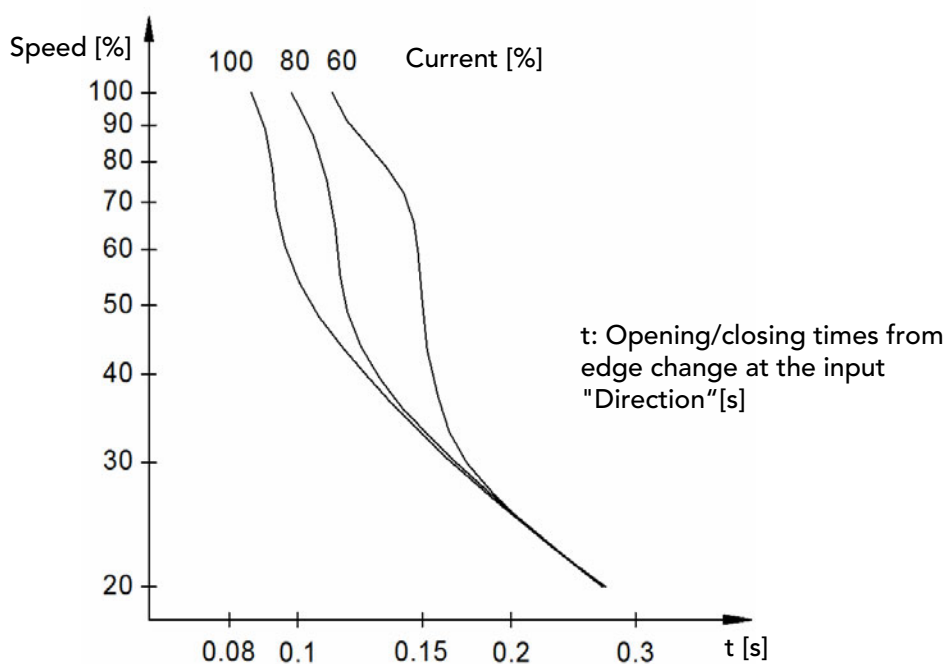


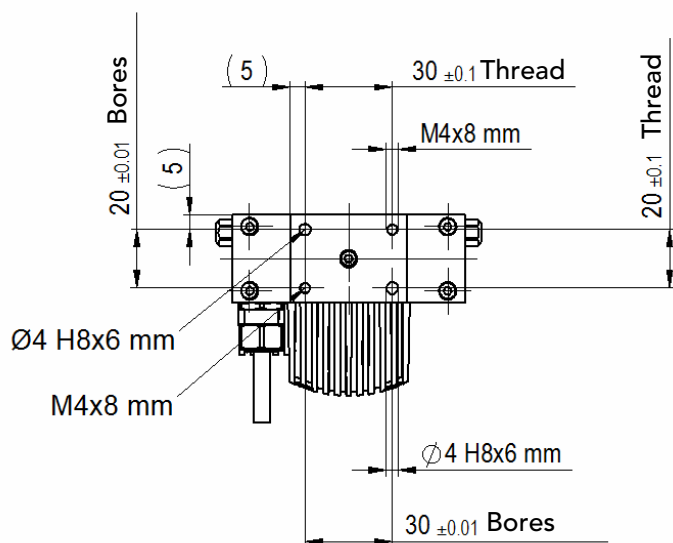
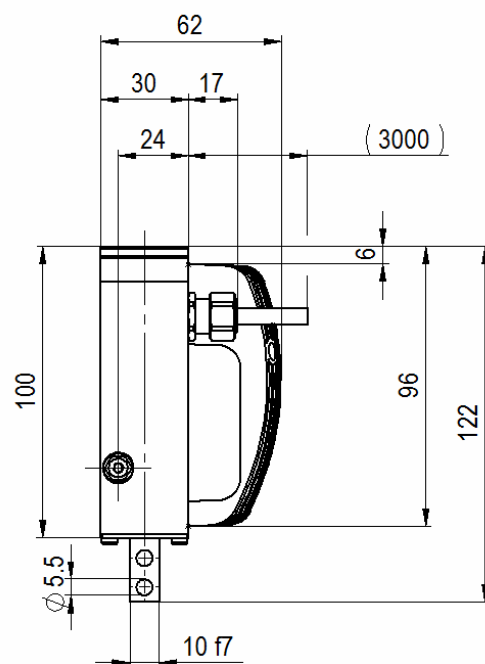
F_s : Gripping force per gripping finger [N]

Important:

The gripping force is influenced by the deformation of the application-specific gripping fingers!

2.3. GPE Opening and closing times



[illegible]

57833

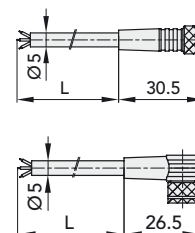
2.5. Scope of delivery

- Electric parallel gripper GPE, stroke 12 mm, with EC motor
- Including ECMR controller, parameterised, with connector
- 3 m data cable, unshielded and towable
- CD-ROM with Windows commissioning software and Operating Instructions in German, English, French and Italian.

2.6. Accessories GPE

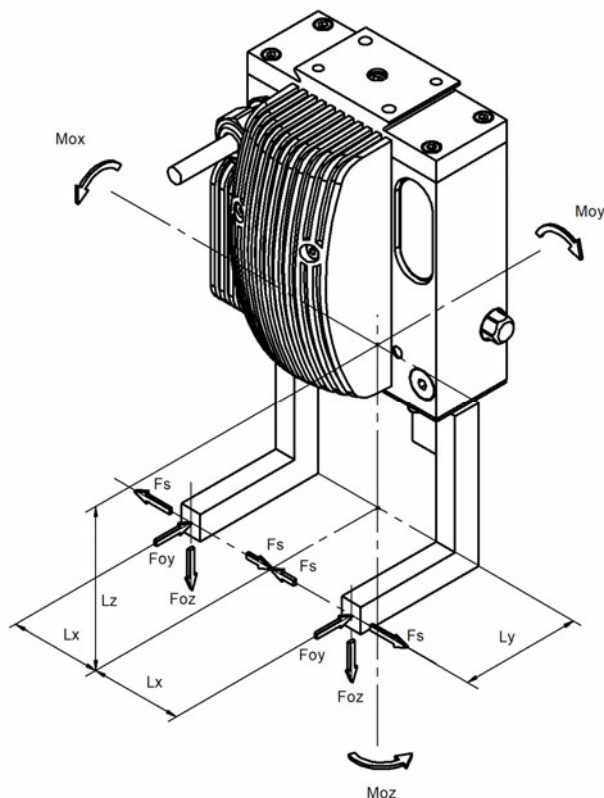
Inductive proximity switches PNP Ø 6,5mm with LED, security against short-circuit and reverse pin connection, switch gap 2mm, flush-mountable:	Ref. No.
length 2m	508842
pluggable M8x1	508843

Connecting cable	Ref. No.
for proximity switch 3-pin, highly flexible, screwable M8x1 ¹⁾	
5 m, with socket straight on one side	504610
5 m, with socket angled on one side	504929
10 m, with socket straight on one side	507528
10 m, with socket angled on one side	507529
¹⁾ especially suitable for dynamic stress, for example movement in energy carrying chains.	



2.7. Permissible loads

Definition of the loads



F_s	[N]	Clamping force per gripper finger
F_{oy}, F_{oz}	[N]	Static forces
L_x, L_y, L_z	[mm]	Distances over which force acts
M_{ox}, M_{oy}, M_{oz}	[Nmm]	Static moments

F_s	[N]	See clamping force diagram
$F_{oy} \text{ zul.}$	[N]	75
$F_{oz} \text{ zul.}$	[N]	80
$L_x \text{ zul.}$	[mm]	80
$L_y \text{ zul.}$	[mm]	80
$L_z \text{ zul.}$	[mm]	100
$(L_x + L_y) \text{ zul.}$	[mm]	80
$(L_y + L_z) \text{ zul.}$	[mm]	100
$(L_z + L_x) \text{ zul.}$	[mm]	100
$M_{ox} \text{ zul.} = F_{oy} \cdot L_z + F_{oz} \cdot L_y$	[Nmm]	1500
$M_{oy} \text{ zul.} = F_s \cdot L_z + F_{oz} \cdot L_x$	[Nmm]	6000
$M_{oz} \text{ zul.} = F_s \cdot L_y + F_{oy} \cdot L_x$	[Nmm]	4000

With cooperation of M_{ox} , M_{oy} , and M_{oz} any moment may reach its permissible maximum.

3. Commissioning

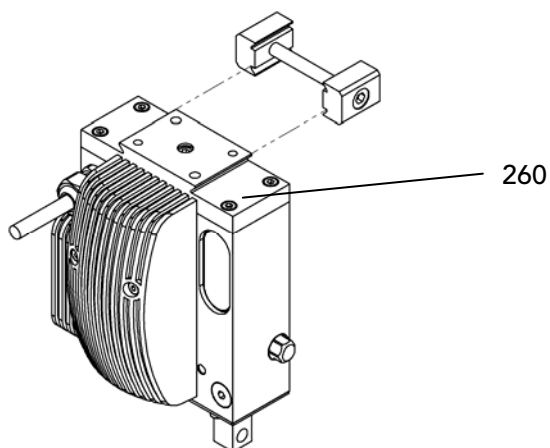
3.1. Installation position and assembly

Electrical parallel grippers GPE can be installed in any position.

The GPE is assembled by means of Quick Set fixing elements (SLL-20-40, SLL-55-40 or SLR-15-40) on the dovetail of the cover (item 260) or via threaded or positioning holes in the cover (item 260).

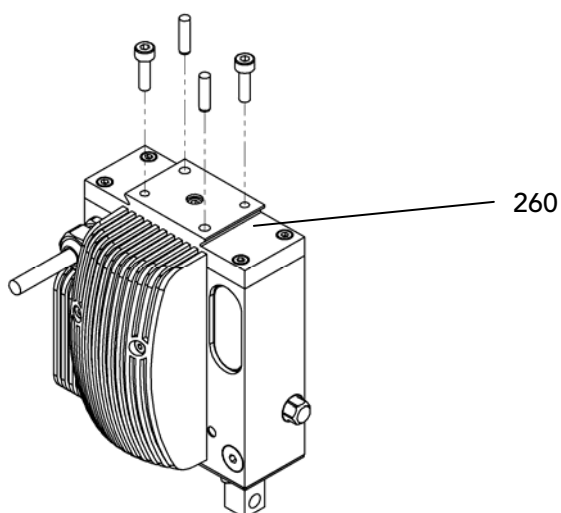
Assembly with Quick-Set fixing elements

GPE with SLL-20-40, SLL-55-40, SLR-15-40



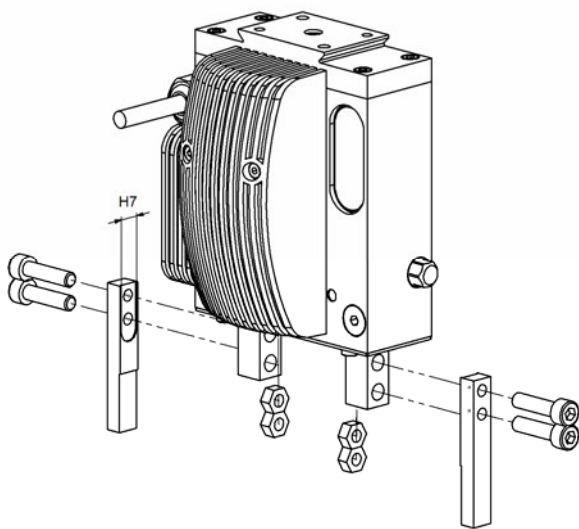
Assembly via threaded and positioning holes

GPE with screws and pins

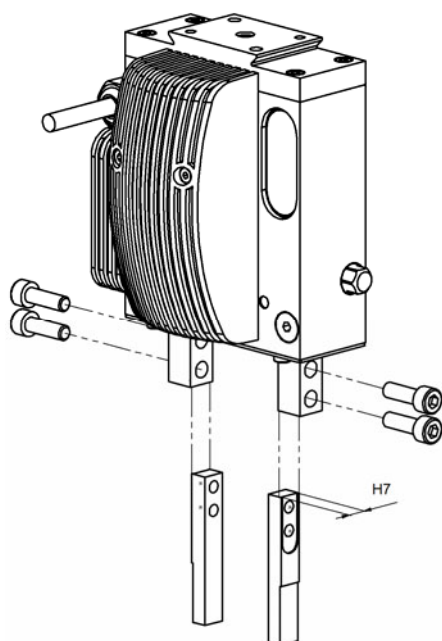


3.2. Mounting of the gripper fingers

Mounting of the gripper fingers on the outside of the gripping jaws



Mounting of the gripper fingers on the inside of the gripping jaws



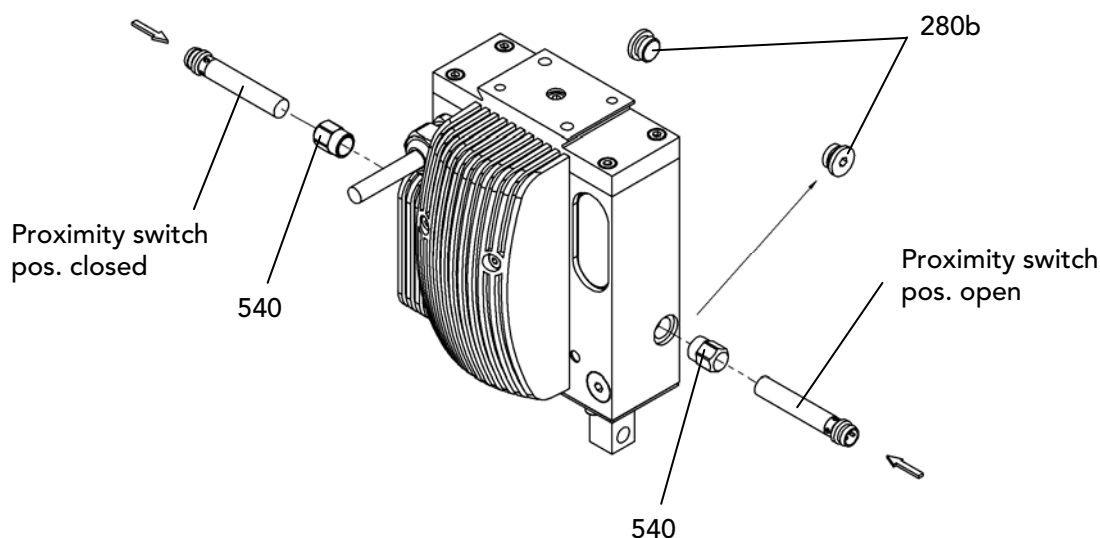
3.3. Installation and connection of the inductive proximity switches

The inductive proximity switches to be installed must fulfill the following conditions:

Switch gap:	2mm
Flush-mountable	
Housing diameter:	6.5mm
Minimum housing length (Ø6.5):	27mm

The proximity switches are mounted by removing the respective closure screw (item 280b), screwing the supplied sensor fixing nut (item 540) into the housing (item 10) and pushing the proximity switch until it stops in the bottom of the hole in the housing (item 10). Fixing is carried out by tightening the sensor fixing nut (item (540).

Installation of the inductive proximity switches



Polling of the clamping position:



In order to ensure polling of the clamping position via the inductive proximity switches, the gripper fingers must be designed so that the clamping position is in the region of an end position of the gripping jaw (< 1 mm before the nominal stroke end).

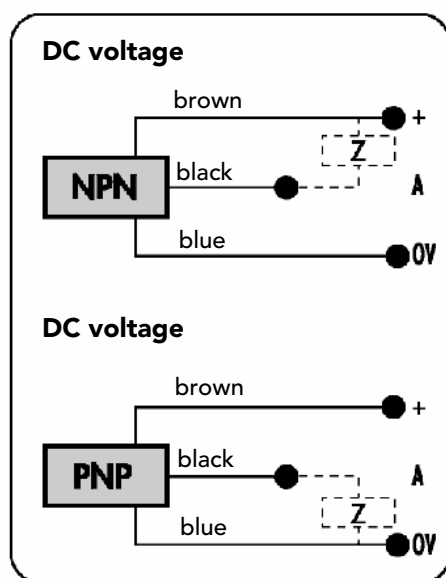
Connecting cable to proximity switch:



To ensure that the forces can never act on the proximity switches, the connecting cables should always be provided with tension reliefs!

The electrical connection is made according to the following diagram:

Connection of the inductive proximity switches



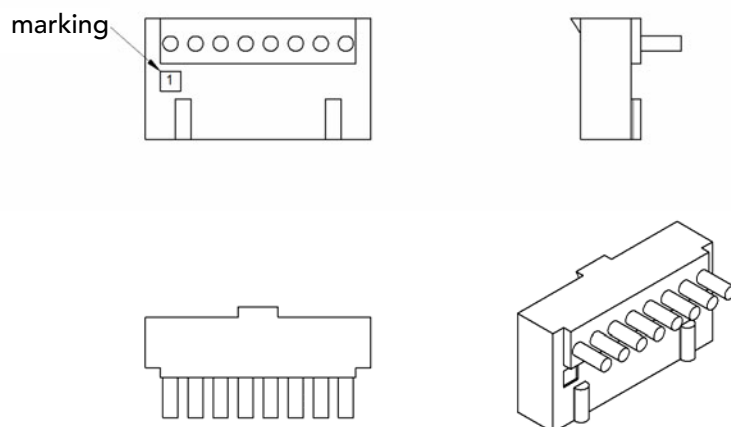
3.4. Internal wiring and cable connections

	Motor		Output cable 10 x 0.25 mm ²	
Designation	Wire color	Plug connector	Wire color	Plug connector (item 530)
Motor winding 1	brown	1	white	1
Motor winding 2	red	2	brown	2
Motor winding 3	orange	3	green	3
U Hall sensors	yellow	4	red	4
GND Hall sensors	green	5	blue	5
Hall sensor 1	blue	6	yellow	6
Hall sensor 2	violet	7	grey	7
Hall sensor 3	grey	8	pink	8
-	-	-	black	n.c.
-	-	-	violet	n.c.

Legend:

n.c. not connected

Plug connector pin assignment



3.5. Wiring of controller

Please refer to Chapter 3.4 "Internal wiring and cable connections" and Operating Instructions BA-100078 ECMR (EC Motor Controller), electrical and software part.

4. Maintenance

4.1. Lubrication



During maintenance work on the GPE, it must be ensured that the drive energy is switched off and cannot be switched on by unauthorized persons.

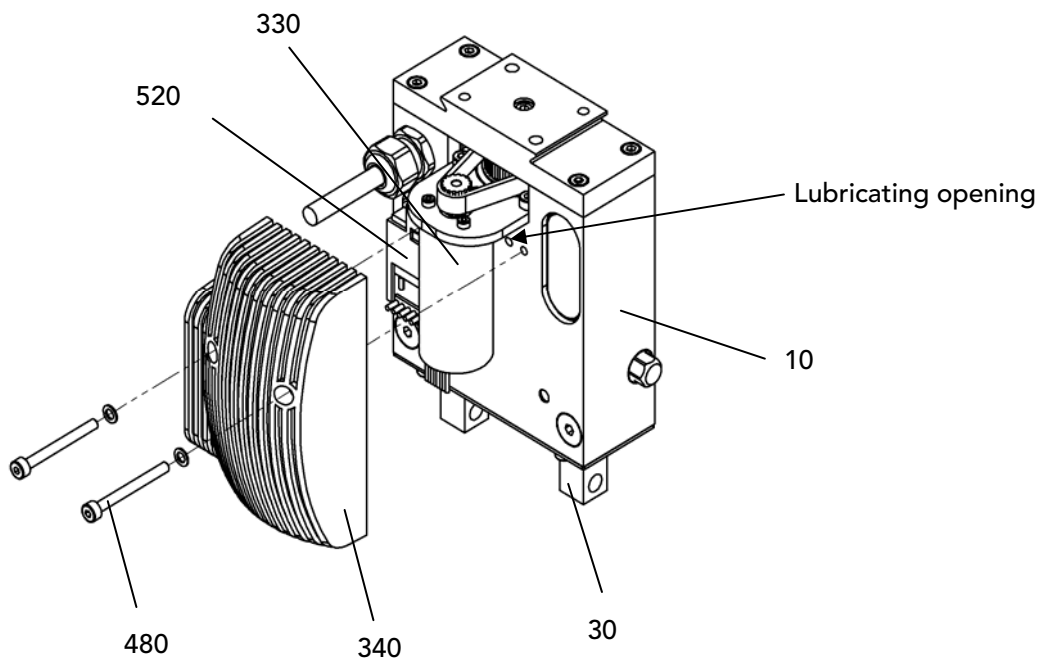
It is essential to use only Klüber oil "Paraliq P460" (Montech Ref. No. 504721) as lubricant.

Lubrication interval: 800 operating hours

Lubrication of ballscrew:

- Loosen cheese head screws (item 480) and remove cover (item 340).
- Move gripping jaws (item 30) to approx. 2 mm before opened end position.
- Apply a few drops of lubricant to the ballscrew (item 80) through the lubricating opening in the housing (item 10). Close and open gripping jaws (item 30) several times. Repeat process 3-4 times.
- Invert cover (item 340) over motor (item 330) and double pin housing (item 520) and fix with cheese head screws (item 480).

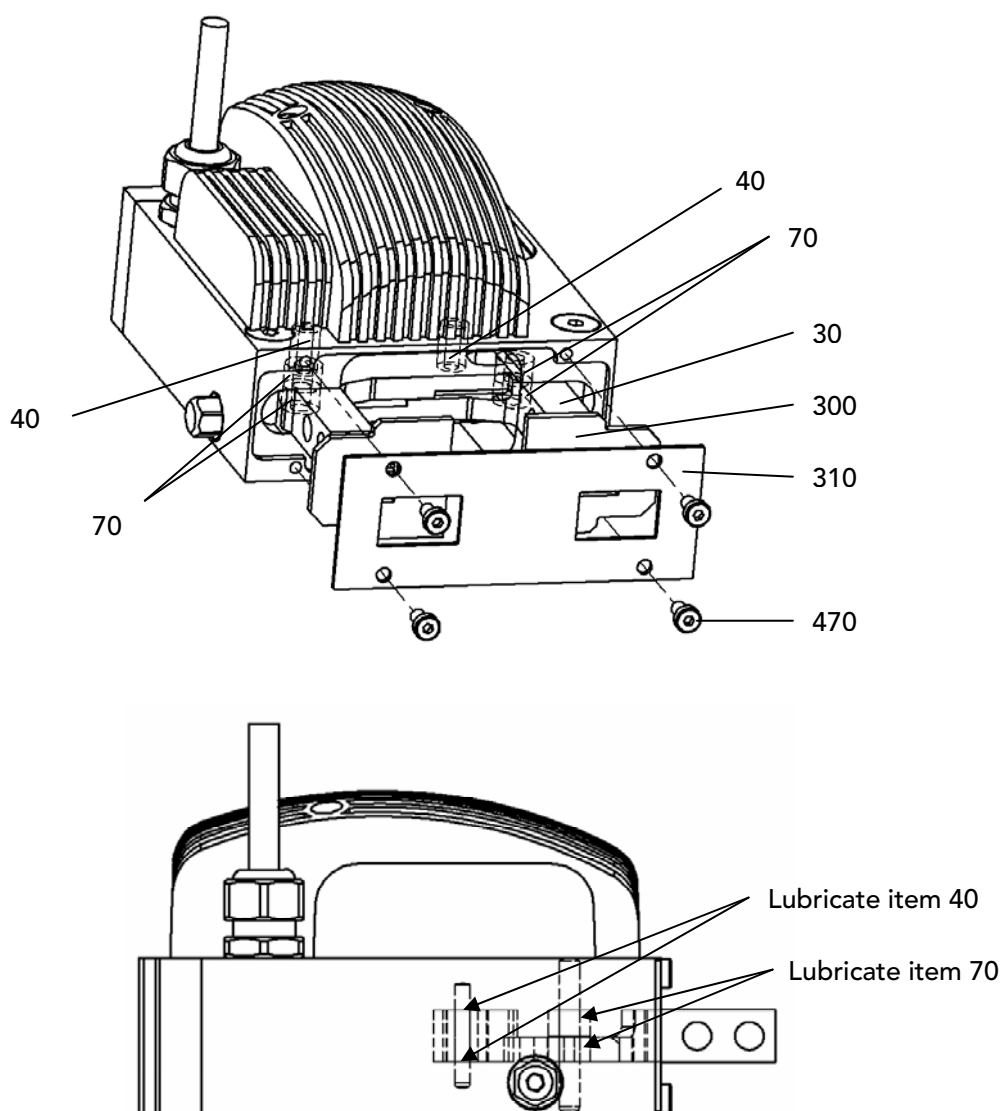
Lubrication of ballscrew



In applications with more than 60 cycles/minute, it is advisable additionally to lubricate the guide rollers (item 70) and the rollers (item 40) at the same time:

- Loosen cheese head screws (item 470) and remove cover plate (item 310).
- Remove both apron plates (item 300).
- Close gripping jaws (item 30) and apply a few drops of lubricant to the guide rollers (item 70).
- Open gripping jaws (item 30) and apply a few drops of lubricant to the rollers (item 40).
- Mount both apron plates (item 300) and fix cover plate (item 310) with cheese head screws (item 470).

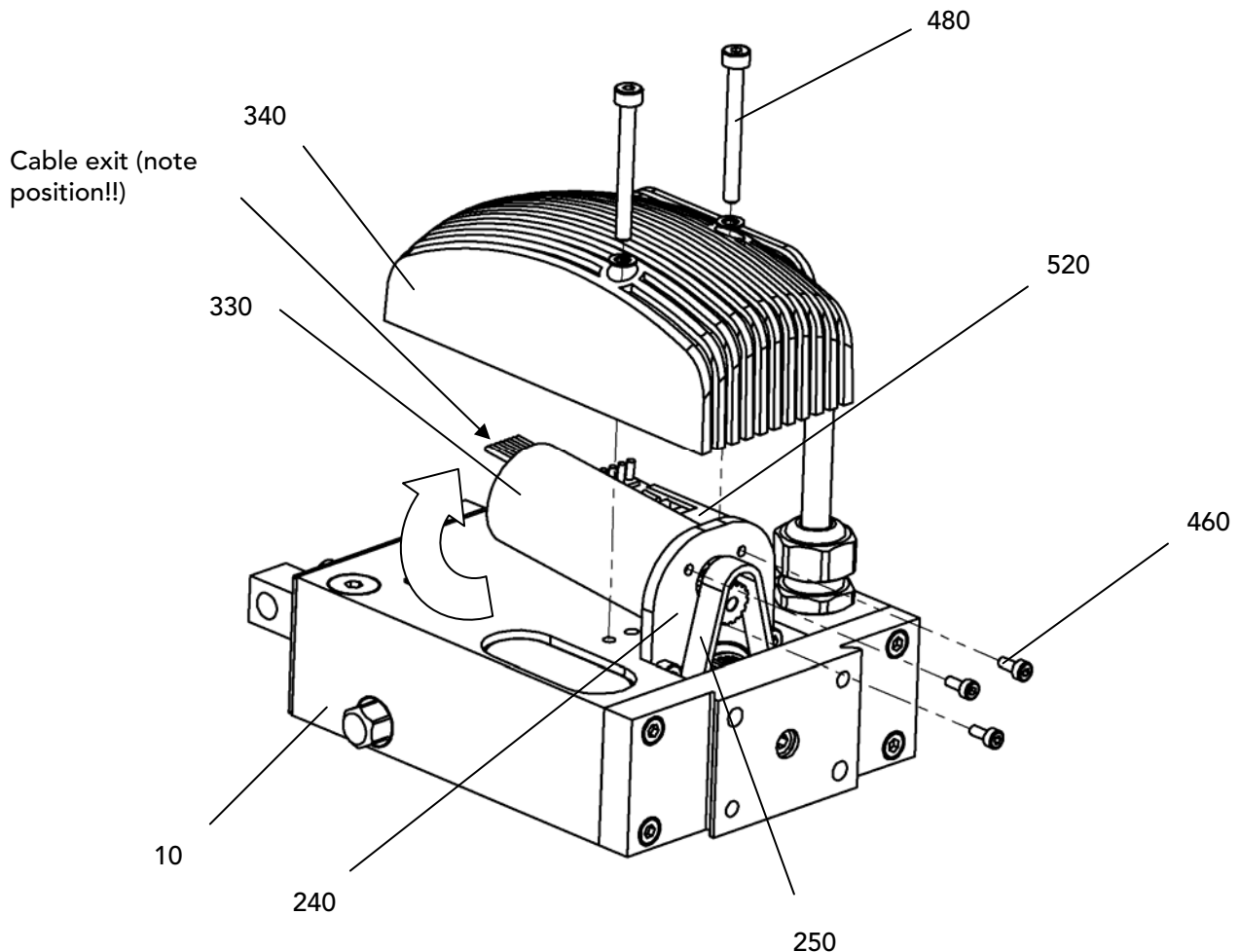
Lubrication of guide rollers



4.2. Replacement of the motor

- Loosen cheese head screws (item 480) and remove cover (item 340).
- Pull motor plug connector out of double pin housing (item 520).
- Loosen the cheese head screws (item 460) and remove motor (item 330).
- Push new motor (item 330) into motor flange (item 240) and push the toothed belt (item 250) over the toothed wheel on the motor (item 330) by tilting the motor (item 330).
- Bring motor (item 330) into a position parallel to the housing (item 10) and fix with the cheese head screws (item 460) to the motor flange (item 240) (note position of cable exit!)
- Check toothed belt tension and set the correct tension according to section entitled "Toothed belt tension" if the tension is too low.
- Insert motor plug connector on the double pin housing (item 520). Note: loop the cable so that the cable cannot make contact with the projecting motor shaft when the cover (item 340) is mounted.
- Invert cover (item 340) over motor (item 330) and double pin housing (item 520) and fix the cheese head screws (item 480).

Installation of motor



4.3. Toothed belt tension

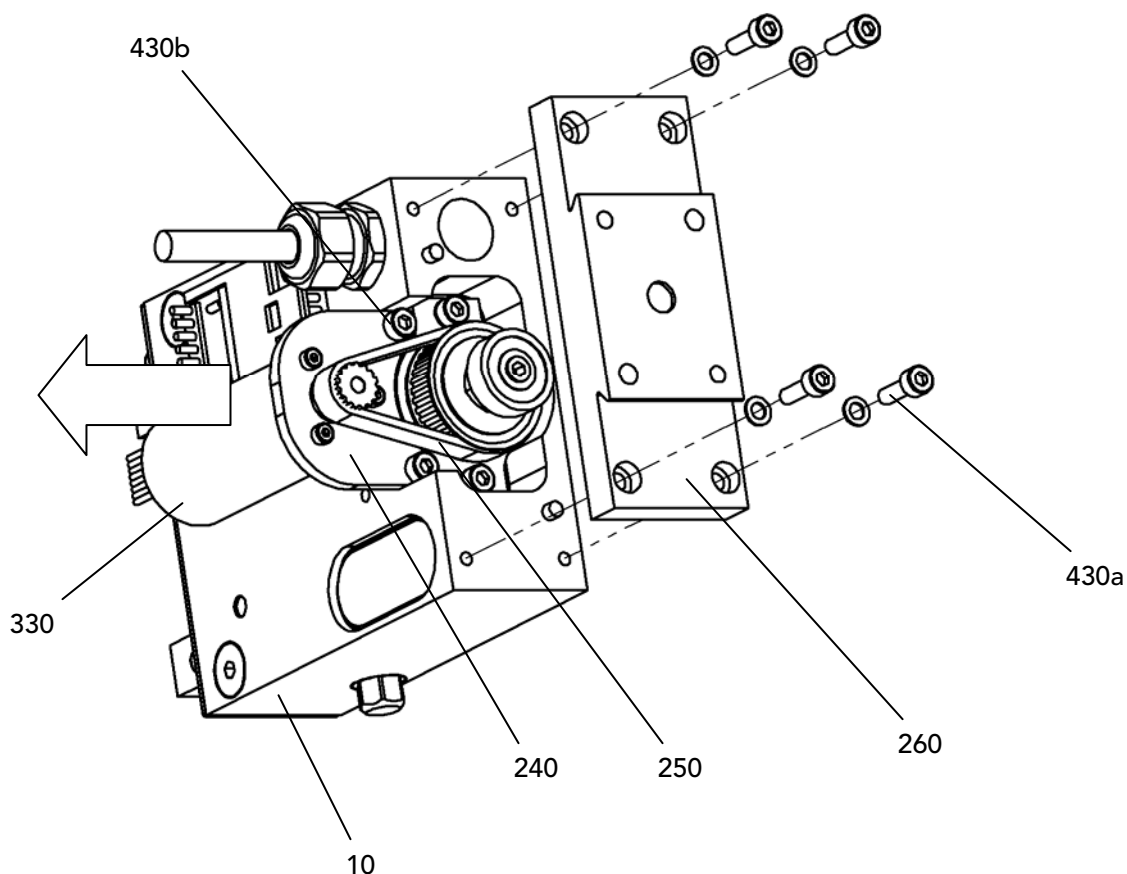
- Loosen cheese head screws (item 430a) and remove cover (item 260).
- Slightly loosen cheese head screws (item 430b).
- Pull motor flange (item 240) with motor (item 330) away from the housing (item 10) so that the toothed belt (item 250) is stretched without initial tension.



Excessive tension of the toothed belt (item 250) can lead to destruction of the motor bearing!

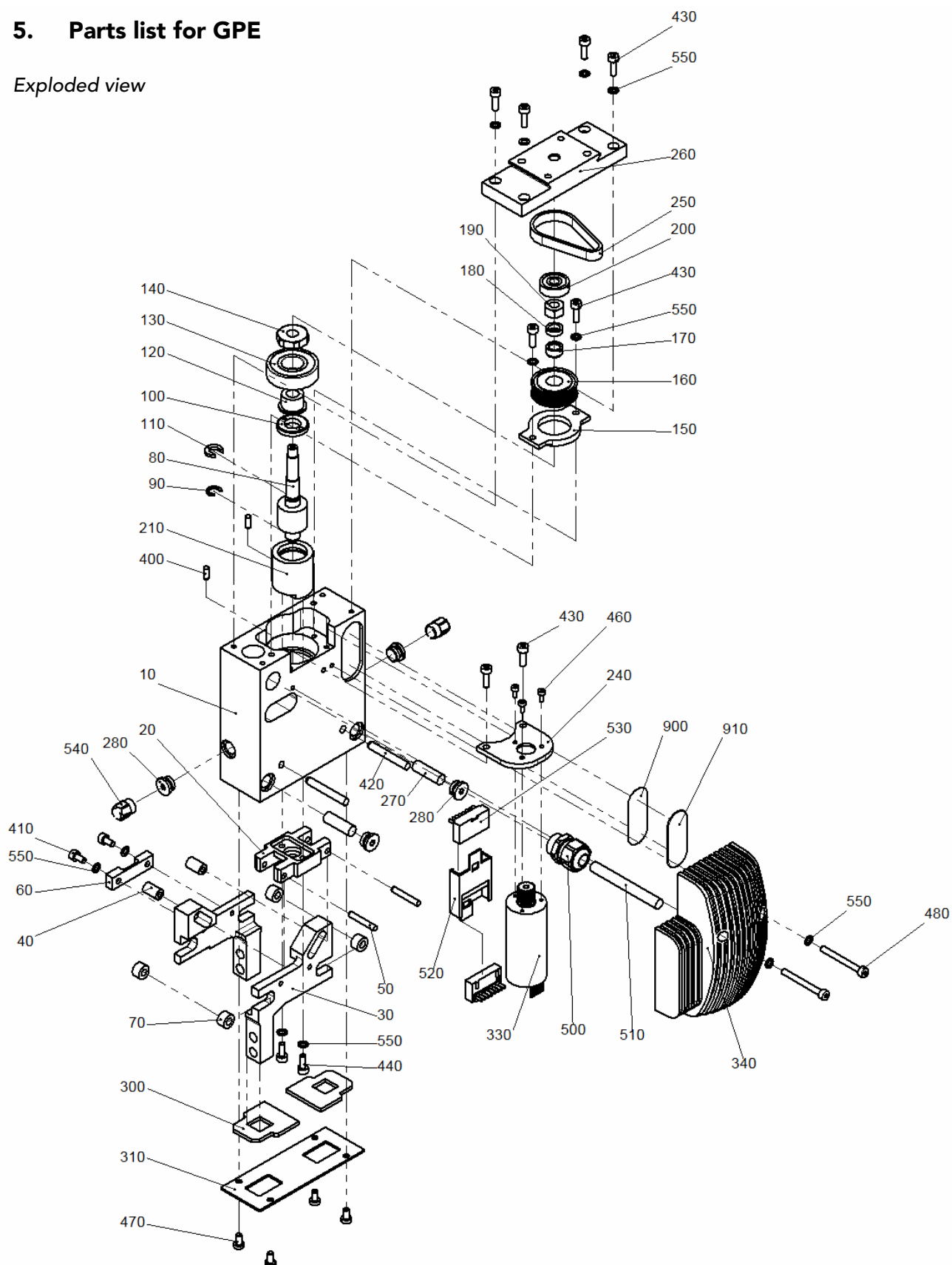
- Hold the motor flange (item 240) and tighten cheese head screws (item 430b).
- Mount cover (item 260) and fix with cheese head screws (item 430a).

Toothed belt tension



5. Parts list for GPE

Exploded view



Item	Sym.	Designation	Ref. No.	Material
	■	Electrical Parallel Gripper GPE	57833	
10	◇	Casing	57397	Aluminum
20	◇	Roller holder	57387	Steel
30	◇	Gripping jaw	56377	Steel
40	◇	Roller	56385	Steel
50	◇	Straight pin	502027	Steel
60	◇	Damper	57392	Steel
70	◇	Guide roller	46289	Steel
80	◇	Ballscrew	56646	Steel/diverse
90	◇	Circlip	520045	Steel
100	◇	Adjusting disk	56645	Steel
110	◇	Support ring	57092	Steel
120	◇	Bearing bush	57177	Steel
130	◇	Deep-groove ball bearing	505244	Steel
140	◇	Hexagon nut M7 x 0.75	57389	Steel
150	◇	Bearing cover	57179	Aluminum
160	◇	Toothed wheel	56649	Aluminum/steel
170	◇	Clamping bushing	510010	Steel
180	◇	Centering sleeve	56405	Steel
190	◇	Hexagon nut M6 x 0.75	520042	Steel
200	◇	Deep-groove ball bearing	508279	Steel
210	◇	Guide peg	56644	Bronze
240	◇	Motor flange	56659	Aluminum
250	●	Toothed belt	520079	PU
260	◇	Cover	56386	Aluminum
270	◇	Buffer	57394	PU
280	◇	Closure screw	56660	Steel
300	◇	Apron plate	56388	POM
310	◇	Cover plate	56387	Steel
330	●	Motor with toothed wheel	57528	Various
340	◇	Cover	57464	ABS
400	◇	Straight pin Ø3h6 x 8	502021	Steel

Item	Sym.	Designation	Ref. No.	Material
410	◇	Cylinder head screw M3 x 6	520043	Steel
420	◇	Straight pin Ø4h6 x 30	502043	Steel
430	◇	Cylinder head screw M3 x 10	502503	Steel
440	◇	Cylinder head screw M3 x 8	508470	Steel
460	◇	Cylinder head screw M2 x 5	520053	Steel
470	◇	Cylinder head screw nK M3 x 6	520040	Steel
480	◇	Cylinder head screw M3 x 30	506035	Steel
500	◇	Cable screw union	520197	Brass
510	◇	Cable	520332	Various
520	◇	Double pin housing	520304	Various
530	◇	Plug connector	520303	Various
540	◇	Sensor fixing nut	507399	Brass
550	◇	Ribbed washer M3	505385	Steel
900	◇	Nameplate	41620	Polyester
910	◇	Clear cover	48508	PU
	●	EC Motor Controller (ECMR)	57332	Various

- These are wearing parts and are available from stock
- ◇ Not available ex stock individually (upon request)
- Price-listed items available ex stock

6. General information

6.1. Environmental compatibility and disposal

Materials used:

- Aluminum
- Steel
- Bronze
- ABS (acrylonitrile-butadiene-styrene)
- PU (polyurethane)
- POM (polyoxymethylene)
- Brass
- Polyester

Surface treatment:

- Anodization of aluminum
- Coating of plastic

Shaping processes:

- Machining of aluminum, bronze and steel
- Injection molding of plastics
- Extrusion of PU

Emissions during operation:

None

Disposal:

Electrical parallel grippers GPE which cannot be used any more should be recycled, not as complete units, but dismantled to components and disposed of according to the type of material. The kind of material used for each part is shown in the spare parts lists. Material which cannot be recycled should be appropriately disposed of.



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